

Miniature HD6D Navigation and Rendezvous LIDAR & Software, Phase I

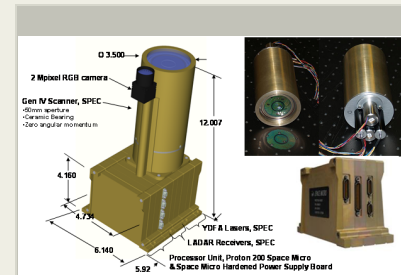
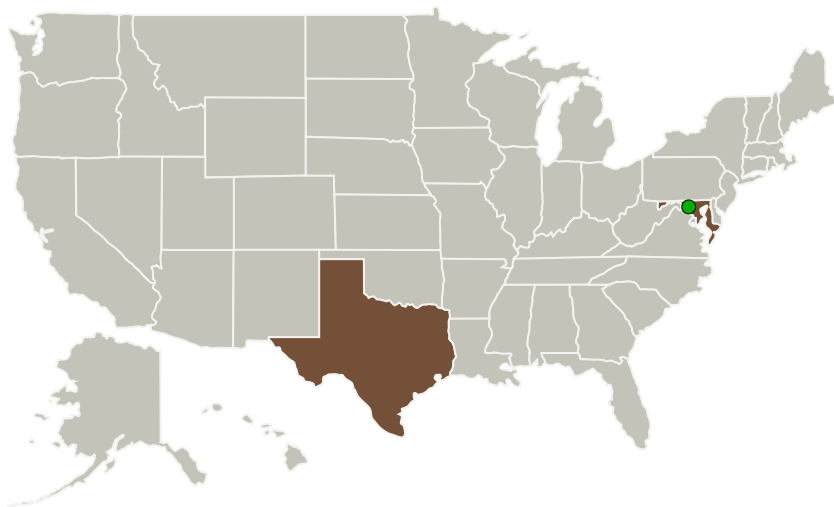
Completed Technology Project (2015 - 2015)



Project Introduction

Systems & Processes Engineering Corporation and Texas A&M University propose a miniature, long range, LIDAR for navigation and rendezvous. The HD6D imaging consists of high resolution, rapid framing 3D LIDAR and RGB camera images fused to give an HD resolution image. The LIDAR output and RGB camera output feed TAMU feature tracking algorithms which give 6DOF relative pose information to all bodies in the FOV. The images are fused into rigid bodies continuously updated as the imaging continues. The 6DOF relative pose information simplifies navigation and rendezvous activities and greatly reduces HD6D image transmission, as the up dated Voxels (volume pixels) of each body can be sent at longer intervals. Range resolution for the HD6D is 3mm at close range, 28mm at acquisition range. Maximum range for the HD6D LIDAR is 30Km. The 32 channel receiver 3D imaging rate is range fold over limited to 12.8Mpps to 375m varying to 160Kpps at longest range. The laser transmits a phase coded pulse train which allows a 13/1 pulse compression increasing signal to noise level by 13x and reducing peak power by 13x for a given joule transmit. This lower peak power avoids nonlinear effects in the gain fiber allowing higher joules.

Primary U.S. Work Locations and Key Partners



Miniature HD6D Navigation and Rendezvous LIDAR & Software, Phase I

Table of Contents

| | |
|--|---|
| Project Introduction | 1 |
| Primary U.S. Work Locations and Key Partners | 1 |
| Project Transitions | 2 |
| Images | 2 |
| Organizational Responsibility | 2 |
| Project Management | 2 |
| Technology Maturity (TRL) | 2 |
| Technology Areas | 3 |
| Target Destinations | 3 |

Miniature HD6D Navigation and Rendezvous LIDAR & Software, Phase I

Completed Technology Project (2015 - 2015)



| Organizations Performing Work | Role | Type | Location |
|---|-------------------------|--|---------------------|
| Systems & Processes Engineering Corporation | Lead Organization | Industry Veteran-Owned Small Business (VOSB) | Austin, Texas |
| ● Goddard Space Flight Center(GSFC) | Supporting Organization | NASA Center | Greenbelt, Maryland |

Primary U.S. Work Locations

| | |
|----------|-------|
| Maryland | Texas |
|----------|-------|

Project Transitions

▶ **June 2015:** Project Start

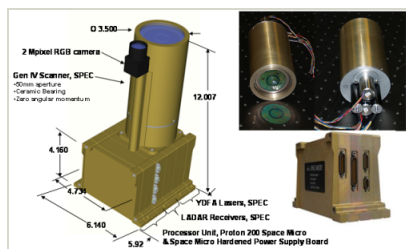
✓ **December 2015:** Closed out

Closeout Summary: Miniature HD6D Navigation and Rendezvous LIDAR & Software, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/139231>)

Images



Briefing Chart Image

Miniature HD6D Navigation and Rendezvous LIDAR & Software, Phase I

(<https://techport.nasa.gov/image/128055>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Systems & Processes Engineering Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

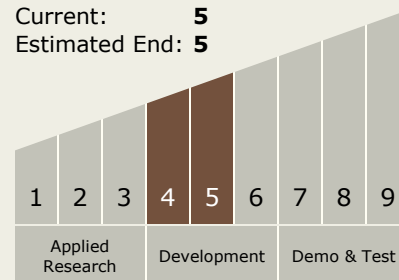
Brad Sallee

Technology Maturity (TRL)

Start: 4

Current: 5

Estimated End: 5



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Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
 - └ TX17.2 Navigation Technologies
 - └ TX17.2.3 Navigation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System